IV. *Methodus quadrandi genera quædam Curvarum, aut ad Curvas Simpliciores reducendi. per A. De Moivre R. S. S.*

SIT A Area Curvæ cujus Abſciſſa x, & ordinatim Applicata $x^m \sqrt{dx-xx}$. Sit B Area Curvæ cujus Abſciſſa eadem cum priori, ſed ordinatim Applicata $x^{m-n} \sqrt{dx-xx}$; ponatur $\sqrt{dx-xx} = y$. Erit Area $A =$

$$d^n B \text{ in } \frac{2m+1}{2m+4} \text{ in } \frac{2m-1}{2m+2} \text{ in } \frac{2m-3}{2m} \text{ in } \frac{2m-5}{2m-2} \text{ \&c,} = P$$

$$-\frac{1}{m+2} x^{m-1} y^3 = -Q$$

$$-\frac{d}{m+1} \text{ in } \frac{2m+1}{2m+4} x^{m-2} y^3 = -R$$

$$-\frac{dd}{m} \text{ in } \frac{2m+1}{2m+4} \text{ in } \frac{2m-1}{2m+2} x^{m-3} y^3 = -S$$

$$-\frac{d^3}{m-1} \text{ in } \frac{2m+1}{2m+4} \text{ in } \frac{2m-1}{2m+2} \text{ in } \frac{2m-3}{2m} x^{m-4} y^3 = -T$$

&c.

Ubi notandum 1° quod n Supponitur numerus integer & affirmativus; 2° Quod Quantitas $d^n B$ in ſerie per P deſignata, multiplicari debet in tot terminos quot ſunt unitates in n; 3° quod tot ſequentes ſeries per $-Q$ $-R$, $-S$, $-T$ &c. deſignatæ ſumi debeant, quot ſunt unitates in n; quod ut

Exemplo uno vel altero clarius fiat, dico quod si $n = 1$, tunc A

$$= d^n B \text{ in } \frac{2m+1}{2m+4} - \frac{1}{m+2} x^{m-1} y^3$$ & si $n = 2$,

$$A = d^n B \text{ in } \frac{2m+1}{2m+4} \text{ in } \frac{2m-2}{2m+2} - \frac{1}{m+2} x^{m-1} y^3$$

$$- \frac{d}{m+1} \text{ in } \frac{2m+1}{2m+4} \text{ in } x^{m-2} y^3$$

4° quod si y ponatur $= \sqrt{dx-xx}$, tunc A erit $= Q - R + S - T$ &c. $\pm P$.

Corollarium.

Si m ponatur æqualis termino cuivis sequentis Seriei

$$-\frac{1}{2}, \frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2} \text{ \&c.}$$

quadratura Curvæ cujus ordinatim Applicata $x^m \sqrt{dx-xx}$, aut $x^m \sqrt{dx+xx}$ finita evadit & exhibetur per seriem nostram; quod ut Exemplo illustretur, Inquirenda sit Area Curvæ cujus ordinatim Applicata $x^{-\frac{1}{2}} \sqrt{dx-xx}$; fingatur Curvam hanc comparari cum Curva cujus ordinatim Applicata $x^{-\frac{3}{2}} \sqrt{dx-xx}$, quoniam hoc in casu $n = 1$, ideo

$$A = d^n B \text{ in } \frac{2m+1}{2m+4} - \frac{1}{m+2} x^{m-1} y^3$$

sed $m = -\frac{1}{2}$, ergo $2m + 1 = 0$, ideoq;

$$A = -\frac{1}{m+2} x^{m-1} y^3 = -\frac{2y^3}{3\sqrt{x^3}}$$

Hic

Hic Obſervatu dignum eſt quod Area ſic reperta interdum data quantitate deficit a vera Area, aut eandem data quantitate excedit; quo autem exceſſus iſte aut defectus innoteſcat, ſupponatur Area reperta augeri minuive data quantitate q, tunc que poſita $x = 0$, ſupponatur Area aucta minutave æqualis nihilo, ſic in præſenti caſu q reperietur $= \frac{2}{3} d\sqrt{d}$, adeoq;

$$A = \frac{2}{3} d\sqrt{d} \qquad \frac{2y^3}{3\sqrt{x^3}}$$

Corollarium $2^{dum.}$

Si n ponatur æqualis termino cuivis ſequentis ſeriei 3, 4, 5, 6, 7, &c. Quadratura Curvæ cujus ordinatim applicata $x^{-n}\sqrt{dx-xx}$ aut $x^{-n}\sqrt{dx+xx}$, finita evadit, & exhibetur per ſeriem noſtram; Inquirenda ſit Area Curvæ cujus ordinatim applicata $x^{-3}\sqrt{dx-xx}$. finge eam comparari cum Area Circuli, quæ vocetur A; erit $m = 0$, $n = 3$, adeoq; $A = P - Q - R - S$. Sed cum quantitas $2m$ infinite parva ſeu potius nulla, in Denominatore termini tertii per quem $d^n B$ multipicatur, extet, Quantitas deſignata per P infinita eſt; atque ob eandem cauſam, Quantitas deſignata per $-S$ infinita evadit, adeoque Quantitates A, $-Q$, $-R$ evaneſcunt: Igitur $P = S$,

divifaque æquatione per $\frac{2m+1}{2m+4}$ in $\frac{2m-1}{2m+2}$ fit

$$d^n B \text{ in } \frac{2m-3}{2m} = \frac{dd}{m} x^{m-3} y^3 \quad \text{ſeu } d^n B \text{ in } \frac{2m-3}{2}$$

$= dd\, x^{m-3} y^3$: ſcriptiſque 0 & 3 pro m & n prodibit

$$dB \text{ in } -\frac{3}{2} = \frac{y^3}{x^3}, \text{ seu } B = -\frac{2y^3}{3x^3},$$

Corollarium $3^{um.}$

Si m ponatur æqualis termino cuivis ſequentis ſeriei, -2, -1, 0, 1 2, 3, 4, 5, &c. quadratura Curvæ cujus ordinata $x^m \sqrt{dx-xx}$, pendet a quadratura Circuli: Area vero Curvæ cujus ordinata $x^m \sqrt{dx+xx}$ pendet a quadratura Hyperbolæ, & relatio iſtius Curvæ cum Circulo aut Hyperbola exhibebetur per Seriem noſtram in terminis finitis.

Corollarium $4^{um.}$

Si m exponatur per alium quemvis terminum differentem ab iis quas ſupra memoravimus, Curva cujus ordinata $x^m \sqrt{dx-xx}$ aut $x^m \sqrt{dx+xx}$, neque quadratur exacte, nec ab Hyperbola aut Circulo pendet, ſed ad Curvam ſimpliciorem reducitur per ſeriem noſtram.

Theorema $2^{um.}$

Sit A Area Curvæ cujus Abſciſſa x & ordinatim applicata $\frac{x^m}{\sqrt{dx-xx}}$ Sit B area Curvæ cujus Abſciſſa eadem cum priori ſed ordinatim applicata $\frac{x^{m-n}}{\sqrt{dx-xx}}$ ponatur $\sqrt{dx-xx} = y$. Erit $A =$

$d^n B$

$$d^n B \text{ in } \frac{2m-1}{2m} \text{ in } \frac{2m-3}{2m-2} \text{ in } \frac{2m-5}{2m-4} \text{ in } \frac{2m-7}{2m-6} \text{ \&c.} = P.$$

$$-\frac{1}{m} x^{m-1} y = -Q.$$

$$-\frac{d}{m-1} \text{ in } \frac{2m-1}{2m} x^{m-2} y = -R$$

$$-\frac{dd}{m-2} \text{ in } \frac{2m-1}{2m} \text{ in } \frac{2m-3}{2m-2} x^{m-3} y = -S$$

$$-\frac{d^3}{m-3} \text{ in } \frac{2m-1}{2m} \text{ in } \frac{2m-3}{2m-2} \text{ in } \frac{2m-5}{2m-4} x^{m-4} y = -T$$

&c.

Obſervationes ad primum Theorema, hic & in ſequentibus locum habent.

Corollarium 1^um.

Si m ponatur æqualis Termino cuivis ſequentis ſeriei, $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2}$, &c. quadratura Curvæ cujus ordinatim applicata $\frac{x^m}{\sqrt{d}\,\overline{x - xx}}$ aut $\frac{x^m}{\sqrt{d}\,\overline{x + xx}}$ finita evadit, & exhibetur per hanc ſeriem.

Corollarium 2$^{um.}$

Si n ponatur æqualis Termino cuivis ſequentis ſeriei 1, 2, 3, 4, 5, 6, 7, &c. Curva omnis cujus ordinatim applicata $\frac{x^{-n}}{\sqrt{dx-xx}}$ aut $\frac{x^{-n}}{\sqrt{dx+xx}}$ quadratur per hanc ſeriem in terminis finitis.

Corollarium 3$^{um.}$

Si m exponatur per terminum quemlibet ſequentis ſeriei, 0, 1, 2, 3, 4, 5, 6, 7, &c. Curva cujus ordinatim applicata $\frac{x^{m}}{\sqrt{dx-xx}}$ pendet a Quadratura Circuli. Curva vero cujus ordinatim applicata $\frac{x^{m}}{\sqrt{dx+xx}}$, a quadratura Hyperbolæ. Etenim ſi Centro C, Diametro $AB=d$ deſcribatur Circulus AEB, ac ſumatur $AD=x$; erecto DE normaliter, junge CE. Sector AEC per ½ dd diviſus æqualis eſt Areæ Curvæ cujus Ordinata $\frac{x^{0}}{\sqrt{dx-xx}}$ Eodem modo, ſi Centro C, Tranſverſo axi $AB=d$, deſcribatur æquilatera Hyperbola AE, ſumatur $AD=x$, erigatur DE ad angulos rectos, jungatur CE; ſector ACE per ½ dd diviſus æqualis eſt Areæ Curvæ cujus ordinata $\frac{x^{0}}{\sqrt{dx+xx}}$

Corol-

Corollorium 4$^{um.}$

Si m ponatur æqualis Termino cuivis, qui non in limitationes præcedentes cadat, Curva cujus ordinata $\dfrac{x^m}{\sqrt{d\,x \pm xx}}$ neque quadratur exacte,, nec a Circulo aut Hyperbola pendet, sed ad Curvam simpliciorem reducitur.

Theorema 3$^{um.}$

Sit A Area Curvæ cujus Abscissa x, ordinatim applicata $x^m \sqrt{rr\text{-}xx}$, sit B area Curvæ cujus Abscissa itidem x, ordinatim applicata $x^{m-2n} \sqrt{rr\text{-}xx}$, ponatur $\sqrt{rr\text{-}xx} = y$. Erit. $A =$

$$r^{2n} B \text{ in } \frac{m-1}{m+2} \text{ in } \frac{m-3}{m} \text{ in } \frac{m-5}{m-2} \text{ in } \frac{m-7}{m-4} \text{ \&c.} = P.$$

$$-\frac{1}{m+2}\, x^{m-1}\, y^3 = -Q$$

$$-\frac{rr}{m} \text{ in } \frac{m-1}{m+2}\, x^{m-3}\, y^3 = -R$$

$$-\frac{r^4}{m-2} \text{ in } \frac{m-2}{m+2} \text{ in } \frac{m-3}{m}\, x^{m-5}\, y^3 = -S.$$

&c.

Corollarium 1$^{um.}$

Si m exponatur per terminum quemvis sequentis seriei 1, 3, 5, 7, 9, &c. Quadratura Curvæ cujus ordinata $x^m \sqrt{rr\text{-}xx}$ aut $x^m \sqrt{rr+xx}$ finita evadit, & exhibetur per hoc Theorema.

Corol-

Corollarium $2^{um.}$

Si n exponatur per terminum quemvis ſequentis ſeriei 2, 3, 4, 5, 6, &c. Curva cujus ordinata $x^{-2n}\sqrt{rr-xx}$ aut $x^{-2n}\sqrt{rr+xx}$, quadratur exacte per hoc Theorema.

Corollarium $3^{um.}$

Si m exponatur per Terminum quemvis ſequentis ſeriei -2, 0, 2, 4, 6, 8, &c. Quadratura Curvæ cujus ordinata $x^{m}\sqrt{rr-xx}$, pendet a Circulo. Quadratura vero Curvæ cujus ordinata $x^{m}\sqrt{rr+xx}$, pendet ab Hyperbola.

Corollarium $4^{um.}$

Si m exponatur per Terminum quemvis differentem ab illis quos ſupra memoravimus, Curva cujus ordinata $x^{m}\sqrt{rr-xx}$, aut $x^{m}\sqrt{rr+xx}$, neque exacte quadratur, nec a Circulo aut Hyperbola pendet, ſed ad ſimpliciorem Curvam reducitur.

Theorema $4^{um.}$

Sit A Area Curvæ cujus abſciſſa x, ordinatim applicata $\frac{x^{m}}{\sqrt{rr-xx}}$, Sit B Area Curvæ cujus Abſciſſa itidem x, Ordinatim applicata $\frac{x^{m-2n}}{\sqrt{rr-xx}}$ Erit $A =$

$r^{2n}B$

$$r^{2n} B \text{ in } \frac{m-1}{m} \text{ in } \frac{m-3}{m-2} \text{ in } \frac{m-5}{m-4} \text{ in } \frac{m-7}{m-6} \; \&c. = P.$$

$$-\frac{1}{m} x^{m-1} y = -Q$$

$$-\frac{rr}{m-2} \text{ in } \frac{m-1}{m} x^{m-3} y = -R$$

$$-\frac{r^4}{m-4} \text{ in } \frac{m-1}{m} \text{ in } \frac{m-3}{m-2} x^{m-5} y = -S$$

$$-\frac{r^6}{m-6} \text{ in } \frac{m-1}{m} \text{ in } \frac{m-3}{m-2} \text{ in } \frac{m-5}{m-4} x^{m-7} y = -T.$$

&c.

Corollarium 1$^{um.}$

Si m exponatur per terminum quemvis sequentis seriei 1, 3, 5, 7, 9, &c. Quadratura Curvæ cujus ordinata $\frac{x^m}{\sqrt{rr-xx}}$ aut $\frac{x^m}{\sqrt{rr+xx}}$, per hoc Theorema habetur in finitis Terminis

Corollarium 2$^{um.}$

Si n exponatur per terminum quemlibet sequentis seriei 1, 2, 3, 4, 5, 6, &c. Curva cujus ordinatim applicata $\frac{x^{-2n}}{\sqrt{rr-xx}}$ aut $\frac{x^{-2n}}{\sqrt{rr+xx}}$ exacte quadratur per hoc Theorema

Mmmmmmm Co

Corollarium 3^um.

Si m exponatur per terminum quemvis ſequentis ſeriei o, 2, 4, 6, 8, 10, &c. Quadratura Curvæ, cujus ordinatim applicata $\frac{x}{\sqrt{rr-xx}}$ pendet a quadratura Circuli. Etenim ſi Centro C radio $CA=r$ deſcribatur Circulus AEG, ſumatur $CD=x$, erigatur DE normalis ad CD, Jungatur CE: Sector CAE per $\frac{1}{2}rr$ diviſus æqualis eſt Areæ Curvæ cujus ordinatim applicata $\frac{x^{0}}{\sqrt{rr-xx}}$. Eodem modo ſi Centro C, Tranſverſo ſamiaxi $CA=r$, deſcribatur æqualatera Hyperbola EAM, ducatur CF ad AC perpendicularis $=x$, ducatur FE axi parallela donec occurrat Hyperbolæ in E, jungatur CE: ſector Hyperbolicus ACE per $\frac{1}{2}rr$ diviſus æqualis eſt Areæ Curvæ cujus ordinatim applicata $\frac{x^{0}}{\sqrt{rr+xx}}$

Corollarium 4^um.

Si m exponatur per terminum quemlibet a præcedentibus differentem, Curva cujus ordinata $\frac{x^{m}}{\sqrt{rr-xx}}$ aut $\frac{x^{m}}{\sqrt{rr+xx}}$ neque quadratur exacte, nec a Circulo aut Hyperbola pendet, ſed ad Curvam ſimpliciorem reducitur,

Theo-

Theorema 5um.

Sit A Area Curvæ cujus abſciſſa x, ordinatim applicata $\frac{x^m}{d-x}$; ſit B Area Curvæ cujus abſciſſa itidem x, ejuſq; ordinatim applicata $\frac{x^{m-n}}{d-x}$ Erit Area

$$A = d^n B - \frac{x^m}{m} - \frac{d\,x^{m-1}}{m-1} - \frac{dd\,x^{m-2}}{m-2} \text{ \&c.}$$

Sit ordinatim applicata $\frac{x^m}{d+x}$, tunc Area erit $=$

$$A = \frac{x^m}{m} - \frac{d\,x^{m-1}}{m-1} + \frac{dd\,x^{m-2}}{m-2} \text{ \&c. } \pm d^n B.$$

Corollarium.

Si m exponatur per terminum quemlibet ſequentis ſeriei, 0, 1, 2, 3, 4, 5, 6, &c. Quadratura Curvæ cujus ordinatim applicata $\frac{x^m}{d-x}$, aut $\frac{x^m}{d+x}$ pendet a quadratura Hyperbolæ;

Vide Fig. 3.

Etenim ductis DE, EF ad angulos rectos, ſumatur $EG = d$, ducatur GH normalis ad EF & ipſi æqualis. Intra Aſymptotos DE, EF deſcribatur Hyperbola per H tranſiens, quo facto ſumatur $GK = x$ verſus E pro primo caſu, at verſus F pro ſecundo; ducatur ordinatim applicata KL: Area $HGKL$ per dd diviſa æqualis eſt Areæ Curvæ cujus ordinatim applica-

$\frac{x^{\bullet}}{d-x}$ aut $\frac{x^{\circ}}{d+x}$. Hinc Solidum generatum a portione Ciſſoidis dum circa Diametrum circuli genitoris revolvit, in finitis terminis exhibetur, data Hyperbolæ Quadratura.

Theorema $6^{um.}$

Sit A Area Curvæ cujus abſciſſa x, ordinatim applicata $\frac{x^m}{rr+xx}$; Sit B Area Curvæ cujus abſciſſa itidem x, ordinatim applicata $\frac{x^{m-2n}}{rr+xx}$, Erit Area

$$A = \frac{x^{m-1}}{m-1} - \frac{rrx^{m-3}}{m-3} + \frac{r^4x^{m-5}}{m-5} \ \&c. \mp r^{2n}B.$$

Corollarium

Si m exponatur per terminum quemlibet ſequentis ſeriei 0, 2, 4, 6, 8, &c. Quadratura Curvæ cujus ordinatim applicata $\frac{x^m}{rr+xx}$ pendet a rectificatione circularis Arcus. Etenim ſi centro C radio $CA=r$ deſcribatur Circulus AEG, ducatur Tangens $AK=x$ jungatur CK peripheriæ occurrens in E; arcus AE per rr diviſus æqualis eſt Areæ curvæ cujus ordinata

$$\frac{x^{\circ}}{rr+xx}$$

Corol-

Corollarium generale ad hæc sex Theoremata.

Curva omnis mechanica cujus quadratura pendet ab aliqua ə Curvis numero infinitis, cujus ordinatæ formas sequentes adipisci possunt $x^m\sqrt{dx \pm xx}$, $\frac{x^m}{\sqrt{dx \pm xx}}$; $x^m\sqrt{rr \pm xx}$ $\frac{x^m}{\sqrt{rr \pm xx}}$ $\frac{x^m}{d \pm x}$, $\frac{x^m}{rr + xx}$, per series has quadrari potest. Hoc Exemplo unico indicare satis erit.

Posito quod Cubus Arcus Circularis Sinui verso correspondentis fiat Ordinata Curvæ, cujus Abscissa sit idem Sinus versus. Inquirenda est Area istius Curvæ.

Sit Abscissa x, arcus circularis v, fluxio Areæ fit $v^3\dot{x}$, Sit Area $v^3x - q$. Igitur $v^3\dot{x} + 3v^2\dot{v}x - \dot{q} = v^3\dot{x}$,

unde $\dot{q} = 3v^2\dot{v}x$; sed $\dot{v} = \frac{d\dot{x}}{2\sqrt{dx-xx}}$, igitur $\dot{q} = \frac{3dv^2x\dot{x}}{2\sqrt{dx-xx}}$,

sed per Theorema II. $\frac{x\dot{x}}{\sqrt{dx-xx}} = \frac{d\dot{x}}{2\sqrt{dx-xx}} - \dot{y} = \dot{v} - \dot{y}$,

adeoq; $\dot{q} = \frac{3}{2}dv^2\dot{v} - \frac{3}{2}dv^2\dot{y}$, igitur $q = \frac{1}{2}dv^3 - \int\frac{3}{2}dv^2\dot{y}$.

Ergo ad hoc perventum est ut fluentem quantitatem inveniamus cujus fluxio est $\frac{3}{2}dv^2\dot{y}$.

Sit hæc quantitas $\frac{3}{2}dv^2y - r$.

Igitur $\frac{3}{2}dv^2\dot{y} + 3dv\dot{v}y - \dot{r} = \frac{3}{2}dv^2\dot{y}$.

Adeoque $\dot{r} = 3dv\dot{v}y = \frac{3}{2}ddv\dot{x}$ Sit $r = \frac{3}{2}ddvx - s$.

Igitur $\frac{3}{2}ddv\dot{x} = \frac{3}{2}ddv\dot{x} + \frac{3}{2}ddx\dot{v} - \dot{s}$.

adeoque. $\dot{s} = \frac{3}{2}ddx\dot{v} = \frac{3d^3x\dot{x}}{4\sqrt{dx-xx}} = \frac{3}{4}d^3\dot{v} - \frac{3}{4}d^3\dot{y}$,

per 2um. Theorema.

Igi-

Igitur $s = \frac{3}{4} d^3 v - \frac{3}{4} d^3 y$. adeoque area quæsita $= v^3 x - \frac{1}{2} dv^3 + \frac{3}{2} d v^2 y - \frac{3}{2} ddvx + \frac{3}{4} d^3 v. - \frac{3}{4} d^3 y.$

Quoniam autem Solida ex rotatione Curvarum genita, Superficies ab eadem rotatione genitæ, Longitudines Curvarum, & Centra Gravitatis horum omnium a Quadratura Curvarum pendent, hæc si a Curvis supradictis pendent facillime computantur.

Postquam Theoremata hæc concinnaveram, eaque Clarissimo *Newtono*, ut supremo harum rerum Judici, monstraveram; obtulit ille mihi Chartas suas manuscriptas, quibus mihi constat se diu compotem fuisse methodi qua, æquatione Trinomiali quavis data naturam Curvæ exprimente, illa Curva aut quadratur aut ad simpliciorem Curvam reducitur.

Optandum autem esset ut non solum ea quæ ad hanc rem spectant, sed alia multa præclara ejus inventa publici juris facere dignaretur. Hoc credo universæ Reipublicæ Literariæ votum esse.

Nullus dubito Doctissimos viros quorum scripta in actis eruditorum alibique tam valde Mathematicas disciplinas promoverunt, methodos huic nostræ affines habere; adeoque nihil in his mihi ascribendum puto nisi quod Theoremata hæc reperierim, nescius an ullibi extarent; eaque ad formam tam facilem reduxerim, ut calculus omnis ad hanc materiam spectans uno quasi intuitu conficiatur. Priusquam scribendi finem facio, non abs re futurum esse arbitror, si nunc, nulla data citius occasione, pauca quædam reposuerim Clarissimi *Leibnitii* animadversionibus, ad Seriem quandam a me publicatam de radice infinitæ æquationis invenienda. Existimat Vir Clar. Seriem illam non satis generalem esse, utpote non attingentem casus ubi quantitates z & y in se invicem ducuntur; adeoque seriem aliam pro mea substituit, hancq; asserit mea infinite generaliorem: illum autem in levem hunc errorem inductum esse suspicor, quod quantitates a, b, c, d, &c. pro quantitatibus datis assumpserit, cum pro quantitatibus datis aut indeterminatis indiscriminatim usurpandæ fuerint. Sed exemplum unum afferre libet, quo pateat seriem nostram casus omnes pervadere; sit Æquatio $nyz - z^3 = y^3$ In Theoremate nostro fiat $a = ny$, $b = o$, $c = -1$, $g = 0$, $h = 0$, $i = 1$, aut melius fiat

$g = yy$, $h = o$, $i = o$. in utroque caſu fiet $Z =$

$$Z = \frac{yy}{n} + \frac{y^5}{n^4} + \frac{3y^8}{n^7} + \frac{12y^{11}}{n^{10}} \&c.$$

V.

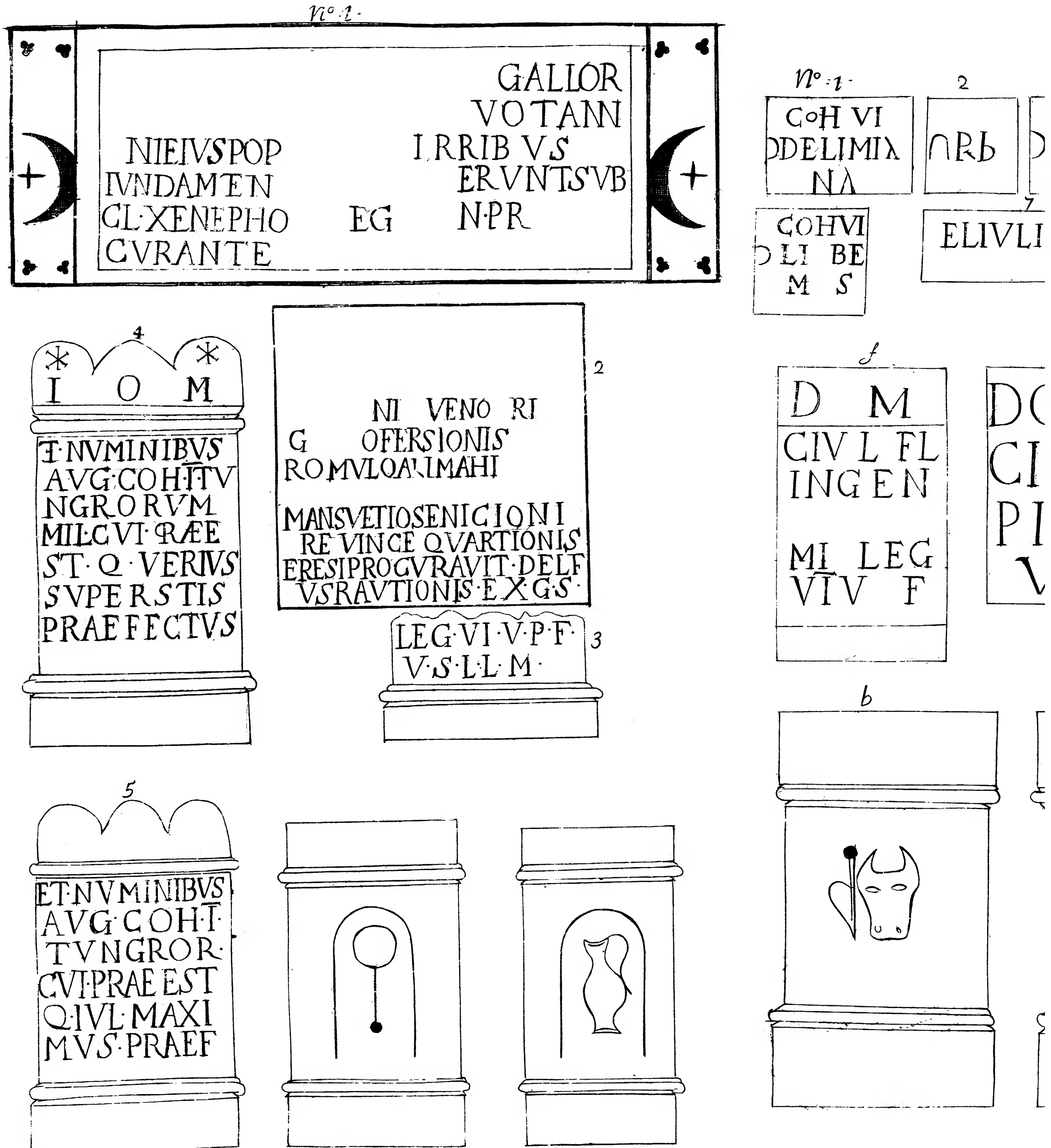
An Account of the Appearance of ſeveral Unuſual Parhelia, *or* Mock-Suns, *together with ſeveral Circular Arches lately ſeen in the Air by* E: Halley.

ON the Eighth of *April*, this preſent Year, 1702, walking in *London* Streets about ten in the Morning, the Air being clear, I obſerved the Sun to ſhine faintly, or as we call it, wateriſh ; whereupon caſting up my Eye, I perceived ſeveral Arches of Circles about him. I made what haſt I could to get on the top of a Houſe, which I did at Mr. *Mordens* by the Royal *Exchange*, and found the Appearance as is deſcribed in Figure 4. *Tab.* 3° wherein

S is the true Sun, *Z* the Zenith.

S T P P a great white Circle paſſing through the Sun, and as near as I could judge, parallel to the Horizon. It was very diſtinct and entire, about two Degrees broad in the *Northern* part about *T* ; and held much the ſame breadth in the *Eaſt* and *Weſt*, but grew narrower towards the Sun, its edges were not very well defined, the whole appearing like a faint white Cloud, and a part of it would have been taken for ſuch, but the whole Circle ſeen in the pure Azure Sky was a very ſurprizing ſight.

V N X Y a *Halo*, or rather *Iris*, that was likewiſe an intire Circle, having the Sun for its Center. I meaſured the Semidiameter of this to be much about 22 Degrees: the breath of this Arch which was well defined, was by eſtimate equal to the Suns Diameter, and it was coloured with the Colours of the *Iris*, but nothing near ſo *vivid* as in the common Rainbow. The *Reds* were next the Sun, and the *Blews* in the outward Limb. Within this Circle the Sky appeared ſomewhat obſcure, eſpecially near the Arch ; and I take it, that the cauſe of that


N° 1.
GALLOR
VOTANN
NIEIVSPOP
IRRIB VS
IVNDAMEN
ERVNTSVB
CL·XENEPHO
EG
N·PR
CVRANTE
N° 1.
COH VI
DELIMIX
NA
2
COHVI
LI BE
M S
7
ELIVLI
4
I O M
T·NVMINIBVS
AVG·COH·I·TV
NGRORVM
MIL·CVI·PRAE
ST· Q · VERIVS
SVPERSTIS
PRAEFECTVS
2
NI VENO RI
G OFERSIONIS
ROMVLOALIMAHI
MANSVETIOSENICIONI
RE VINCE QVARTIONIS
ERESIPROCVRAVIT·DELF
VSRAVTIONIS·EX·G·S·
LEG·VI·V·P·F·
V·S·L·L·M·
3
f
D M
CIV L FL
INGEN
MI LEG
VIV F
b
5
ET·NVMINIBVS
AVG·COH·I·
TVNGROR·
CVI·PRAE EST
Q·IVL·MAXI
MVS·PRAEF

Tab:1.


3
ↄ P.P
4
COH X
IVNRV
5
COHVI
LOVS
SVAVIS
7
.IVLIANI
8
ↄ CVSINIO
e
DOLOCHENO
CIVL PVBL
PIVS TRIB
V S L M
d
IMPERAT C
MAVRELIOAN
POTEST
a
c

Tab: 2.

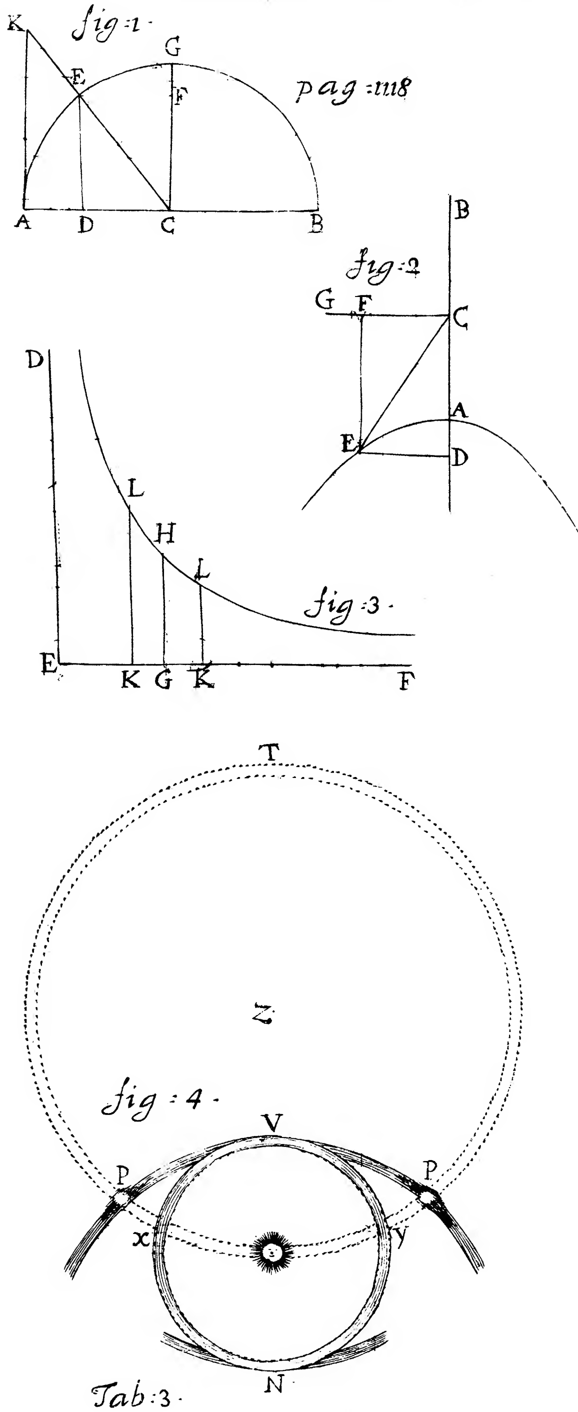
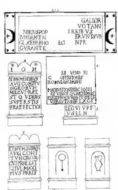


fig: 1.
pag: 1118
K
E
G
F
A
D
C
B
fig: 2.
B
G
F
C
A
E
D
fig: 3.
D
L
H
L
E
K
G
K
F
fig: 4.
T
Z
V
P
P
x
y
N

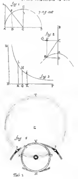
Tab: 3.

Philos Transact Nº 272



Tab 1

Tab 2


Tab 3